AMATEUR SATELLITE REPORT

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Seventh Anniversary Edition

This issue of *Amateur Satellite Report,* Number 169, begins our eighth year of production and distribution to the Amateur Radio Community. We wish to thank all those who have supported these efforts over the years!

AMSAT and ARRL File Amateur Space Station Proposal With NASA

by Bill Tynan W3XO,
VP for Manned Space Projects

On January 19th, a proposal, jointly prepared by AMSAT and ARRL, was filed with NASA for Amateur Radio's participation on the Space Station to be built in the 1990s. The proposal is intended to provide NASA with an early expression of interest on the part of radio amateurs in taking part in the Space Station program and outline the contributions that Amateurs Radio can make to the U.S. space effort in general and the Space Station in particular. Dubbed SSAR, for Station Amateur Radio, the joint proposal cites a number of contributions that Amateur Radio can make. Among them are:

- Promote favorable public awareness of the Space Station and the U.S. space program
- Perform experiments in voice data and video communication
- Furnish a means of recreation for the crew
- Provide an independent backup communication facility

Modes envisioned are:

1. Direct voice communication between the Space Station amateur station and ground based amateur stations.
2. Direct data communication between the Space Station amateur station and ground based amateur stations.
3. Store and forward data communications between ground based amateur stations using the Space Station amateur station equipment in an unattended mode.
4. Relayed voice communication between the Space Station amateur station and ground based amateur stations using the AMSAT Phase 4 geostationary satellite.
5. Relayed data communication between the Space Station amateur station and ground based amateur stations using the AMSAT Phase 4 geostationary satellite.
6. Relayed video communication from the Space Station amateur station to specially equipped ground based amateur television receiving stations using the AMSAT Phase 4 geostationary satellite.

The proposal treats Mode 6 in some detail because it is considered most important in terms of the contribution that Amateur Radio can make to the Space Station program. It will enable scheduled two way communication sessions to be held between the Station crew and various schools youth encampments and civic gatherings. To accomplish this, a high quality video link from the Station to special ground stations mounted in trucks and vans and manned by teams of volunteer amateurs. These portable stations will set up at each chosen site and connected into the facility's existing video system.

AMSAT and ARRL emphasize that a key element in establishing these links on a scheduled basis and for a sufficient amount of time for an adequate demonstrations will be the AMSAT Phase 4 geostationary satellite now in the planning stage and expected to be in orbit by the time SSAR operations begin. This advanced amateur spacecraft will provide the wide area coverage needed for the Space Station amateur station in its low earth orbit, in much the same way that TDRS does for NASA's communications links. It is planned that voice and data uplinks from the ground to the Space Station and voice, digital and video channels will be able to be accommodated through Phase 4.

The proposal makes it clear that the Space Station operators of the SSAR equipment must be licensed radio amateurs. It notes that several NASA astronauts are already licensed with others interested in obtaining licenses.

ARRL Board Resolves To Upgrade Space Station Commitment

The following is the text of a resolution adopted by the ARRL Board of Directors at their meeting held January 22 and 23:

"WHEREAS, the United States Manned Space Program offers a valuable opportunity to conduct Amateur Radio Experiments and operations from space, and

"WHEREAS, the National Aeronautics and Space Administration has demonstrated its willingness to consider Amateur Radio participation in the Space Station and Space Shuttle Projects, and

"WHEREAS, Amateur Radio operation aboard manned space vehicles provides excellent public relations for Amateur Radio, and

"WHEREAS, although there have been significant contributions on the part of many individuals and organizations, additional benefits to Amateur Radio from support in the Manned Space Program remain,

"BE IT RESOLVED, that the American Radio Relay League continue and expand its participation in the NASA Manned Space Program to ensure that Amateur Radio activities therein are developed to their fullest potential."

Writers To Feature Phase 3C Articles In Media Blitz

A team of writers is being assembled to report on various aspects of Phase 3C to the general Amateur Radio community. Among those writing articles on various topics are N5BF, WA2FTK, KC2PH, W5IU, WØRPK, N9CUE, N2GJ, KCØLI, KØKE, KO5I and WA2LQQ. More authors are sought to write on interesting topics concerning Phase 3C such as how to use the new satellite, suitable equipment and operating techniques.

To help the authors, AMSAT has compiled a press kit which provides a core body of information about the spacecraft, the launcher and the recommended user equipment suites. Together with publishable photographs, the press kit will be supplied to volunteer authors to help

them in publishing their work. Prospective authors are sought immediately since early deadlines for article placement in the May and June magazines are approaching. Editors of *QST, Ham Radio, 73* and *CQ* have said they will welcome Phase 3C articles. To participate in this important aspect of getting Phase 3C information out, please contact AMSAT HQ immediately. Call Monday through Friday, during business hours at 301-589-6062.

To help promote interest in Phase 3C among those who are not currently familiar with OSCARs, AMSAT is preparing a multi-pronged advertising and promotional program. A fine artistic rendering of Phase 3C has just been completed by Mr. William Hans of Denver, Colorado with the assistance of Regional Coordinator Jack Crabtree, AAØP. Mr. Hans's air brush color painting faithfully reproduces Phase 3C including the new antenna configuration. This painting will appear in various magazine advertisements to help communicate not only the image and technology of Phase 3C but its spirit as well. A special limited edition Phase 3C Launch commemorative QSL card featuring the Hans painting is now being prepared and advance reservations are now being accepted at AMSAT HQ. AMSAT is grateful to Mr. Hans for his donation of this beautiful space-art work.

With activity levels increasing on many fronts, AMSAT HQ is encouraging all its Area Coordinators and members to take an active part in helping make Phase 3C a success in terms of membership as well. It is especially important to promote new membership now since launch preparations and related expenses tax AMSAT's budget. New and renewing members are urgently needed to help offset rising expenses. AMSAT's financial managers advise it is certain a cutback in services will be necessary if membership and donation trends remain below necessary levels. Donations are always welcomed and may be tax-deductible.

In sum, AMSAT is looking forward to the Spring launch of Phase 3C and is working on several fronts to make it a success. Members and donors need to do their part NOW to sustain the organization.

Transpolar Skitrek Progress Report #1: February 1, 1988

Prepared by Rich Ensign, N8IWJ
AMSAT Science Education Advisor
For Use With The AMSAT Teachers Guide
"Exploring The High Arctic From Your Classroom"

Preparations for the Transpolar Skitrek continue as the Digitalker on UoSAT OSCAR 11 is being tested. Thousands of classrooms around the world are receiving the AMSAT teacher's guides and will be following the expedition through the use of follow-up progress reports. Progress reports will be read on AMSAT nets, transmitted through packet radio networks and will appear on the WØRPK AMSAT digital BBS (1-515-961-3325).

Dimitri Shparo, UA3AJH, expedition leader, was in Canada recently while the Skitrek communications team from the CRRL under the leadership of its President Tom Atkins, VE3CDM, visited the Russian communications team in Moscow. A stopover at the University of Surrey in England was also planned on the way home from Moscow.

Canadian skiers Richard Weber, VE8RW, and Laurie Dexter, VE8LD have been granted special Amateur Radio operator status for the trek and the suffix of their calls is also their initials. The support station at Resolute has been given the special call CI8C. Operators of the station with VE8 calls may use this CI8 prefix when communicating from the station. Support communications with the skiers will occur mostly on the 80 meter band with general communications on the 80, 40, and 20 meter bands. No QSO'ing with the skiers will be possible due to the limited life of their 10 watt rigs' lithium batteries. Those who contact Resolute may QSL to P.O. Box 313, Don Mills, Ontario, M3C 2S7, Canada. The Resolute CI8C station be activated in mid-February.

Why not test your HF capabilities in the Resolute direction by QSO'ing with Bob James, VE8DX, who lives at Pond Inlet on the northern shore of Baffin Island. He is several hundred miles east of Resolute at 73 degrees North latitude. Bob often can be found on the 20 meter band at 14.181 MHz.

UoSAT OSCAR 11 Digitalker Schedule During The Skitrek

(Official UoSAT Team plan as of 1/29/88)

Experience with classroom reception of UoSAT suggests that for a typical "pass", the clear reception period lasts around three to four minutes, so we have put together a schedule with this in mind.

The following schedules are what we intend to use:

DAILY SCHEDULE: From loading the weekly bulletin (Thursday) until the following Wednesday.

TELEMETRY	60 seconds	then	DIGITALKER	60 seconds
STATUS POINTS	15 seconds	then	BULLETIN	120 seconds
DIGITALKER	60 seconds	then	WHOLE ORBIT DATA	240 seconds
DIGITALKER	60 seconds	then	DCE TITLES	60 seconds

Repeated... Total cycle time 11.25 minutes.

Wednesday remains EDUCATION DAY with the following schedule:

00:00 hrs UTC until 14:00 hrs UTC:
TELEMETRY: 150 seconds; DIGITALKER: 30 seconds
Repeated... Total cycle time 3 minutes.
14:00 hrs UTC Wednesday until the bulletin is reloaded on Thursday:
WHOLE ORBIT DATA: 120 seconds; DIGITALKER: 60 seconds
Repeated... Total cycle time 3 minutes.

This may change. Watch the Progress Reports for details. See the guide introduction as to how to receive Progress Reports.

Requests for the teachers guide are now being filled as received. Requesters should write or call: Richard C. Ensign, N8IWJ, AMSAT Science Education Advisor, 421 N. Military, Dearborn, MI 48124, U.S.A. To facilitate mailing please include five 22 cent stamps with requests. Guides with predictions total 20 pages.

Short Bursts

• AMSAT OSCAR 10 was withdrawn from service on February 6 due to poor performance attributed to sagging sun angles. Severe FMing of the passband had been noticed for several days prior to the decision to shut it down. AO-10 will return to service in approximately three months.

• On Saturday, March 12, Radio RSA, the voice of South Africa, will present a special program for Radio Amateurs world-wide. Produced and presented by SA AMSAT President Hans van de Groenendaal, ZS6AKV, the program will feature Amateur Radio News from around the world including Satellite activity, DXpeditions and more. The program will air as follows:

March 12 at 1845 UTC (Service for UK, Europe and Africa): 17880 kHz
March 13 at 0250 UTC (Service for USA and Canada): 9580, 9615 and 6010 kHz.
Other programs will follow on weekly schedules as above.

Transpolar Skitrek Progress Report #2: February 5, 1988

Prepared by Rich Ensign, N8IWJ
AMSAT Science Education Advisor
For Use With The AMSAT Teachers Guide
"Exploring The High Arctic From Your Classroom"

The final two Canadian skiers in the Transpolar Skitrek Expedition have been announced by expedition leader Dr. Dimitri Shparo, UA3AJH.

Dr. Maxwell Buxton, M.D., a practicing physician from Calabogie, Ontario. He is an experienced cross-country skier and backpacker and is 31 years old.

Christopher Holloway, a computer technician from Chelsea, Quebec is 30 years old and is also a well qualified backpacker and cross-country skier.

These two complete the full complement of four Canadians participating in the expedition. Profiles of the first two Canadian skiers may be found in the guide. Dr. Shparo's profile is in the guide as well. Here is information about two key Russian expedition members.

Dr. Mikhail G. Malakhov, M.D. is Medical Chief of the expedition. He is Assistant Professor at the Raizan Medical Institute and is 53 years old. Dr. Malakhov is married and has two sons.

Dr. Yury I. Khmelevsky, Ph.D., has his degree in mathematics and is Scientific Director of the expedition. He travelled to the North Pole with Dr. Shparo's 1979 expedition. Dr. Khmelevsky is 50 years old, married and has two daughters and one son.

Additional topics/questions to be explored in the classroom with the aid of an Amateur Radio operator:

1. How can short wave (HF) signals travel such long distances? Explore the term propagation.
2. What is the aurora borealis (northern lights)? What causes this phenomenon? What effect will the aurora have on northern communications? Is there a southern lights that could effect communications in the Antarctic? What is "Arctic flutter"?
3. Can you become adapted to the -50 degrees C. dry cold of the arctic?
4. Why can Arne Christensen and his class in Gistrup, Denmark monitor UoSAT Oscar 11 ten times a day while Bindu Rao in Bangalore, India can only pick it up on four or five passes per day?

Can you think of additional topics/questions/concepts to explore beyond those listed here and in the guide? If so, write and tell us what you have in mind.

Progress Reports like this one may be accessed via packet BBS, AMSAT Nets and the main educator source, the WØRPK AMSAT Bulletin Board (1-515-961-3325). Progress Report #3 will be issued on February 12, 1988.

Ariane 4 Launcher Characteristics

1.0	Launcher, General			
1.1	Model Ariane 4			
1.2	Flight V-22; first demonstration flight of the Ariane 4 launcher			
2.0	Ariane 4 Capabilities			
2.1	To GTO: 4200 kg			
2.2	To heliosynchronous (800 km): 4500 kg			
2.3	To LEO (200 km): 8000 kg theoretical; limited by structural design			
2.4	Escape orbit: 2600 kg			
3.0	General Specifications, Ariane 4, Configuration 44LP			
3.1	Configuration 44LP: 2 Liquid strap-ons; 2 solid strap-ons			
3.2	Mass to GTO: 3700 kg			
3.3	Height: 58.4 m			
3.4	Approximate lift-off mass: 471 metric tons			
3.5	First stage: L220; height 23.6 m			
3.5.1	Four Viking V engines			
3.5.1.1	Thrust (each engine): 668 k			
3.5.1.2	Specific Impulse: 241 seconds (atm); 279.7 seconds (vacuum)			
3.5.1.3	Burn time: 204 seconds			
3.5.1.4	Chamber pressure: 58.5 bars			
3.5.1.5	Propellant system: 226 metric tons of N2O4 + UDMH + hydrazine hydrate			
3.5.2	First Stage Liquid Strap-Ons			
3.5.2.1	Two Viking VI engines			
3.5.2.1.1	Thrust (each engine): 661 kN			
3.5.2.1.2	Specific Impulse: 241 seconds (atm); 279.7 seconds (vacuum)			
3.5.2.1.3	Burn time: 135 seconds			
3.5.2.1.4	Propellant system: 37 metric tons of N2O2 + UDMH			
3.5.2.1.5	Dimensions: Height 18.6 m; diameter 2.15 m			
3.5.3	First Stage Solid Strap-Ons			
3.5.3.1	Two solids each with 635 kN thrust; burn time 34 seconds			
3.5.3.2	Propellant system: 9.5 metric tons of solid propellant			
3.6	Second stage: L34; height 8.1 m			
3.6.1	One Viking VI engine with 786 kN thrust (in vacuum)			
3.6.2	Burn time: 123 seconds			
3.6.3	Chamber pressure: 58.5 bars			
3.6.4	Propellant system: 34 metric tons of N2O4 + UDMH			
3.7	Third stage: H10; height 7.1 m			
3.7.1	One HM7 engine with 62 kN thrust (in vacuum)			
3.7.2	Burn time: 725 seconds			
3.7.3	Chamber pressure: 35 bars			
3.7.4	Propellant system: 10.5 metric tons of cryogenics (LOX and LH)			
4.0	Approximate Launch Time Line			
4.1	First Stage Burn			
4.1.1	T+34 s: Solid burn out;	h= 2.3 km;	v= 492	m/s
4.1.2	T+137.8 s: Liquid burn out;	h= 36.9 km;	v= 1567	m/s
4.2	T+213 s: 1/2 Sep & 2nd ign;	h= 76.2 km;	v= 3256	m/s
4.3	T=297.7 s: Fairing jettisoned;	h= 116.6 km;	v= 4597	m/s
4.4	T+345.7 s: 2/3 Sep & 3rd ign;	h= 140.8 km;	v= 5838	m/s
4.5	T+1076.4s: 3rd cutoff; begin inj;	h= 227.8 km;	v= 10213.7	m/s
5.0	Payload Deployment Sequence (Exact timing TBS)			
5.1	Jettison fairing			
5.2	Deploy METEOSAT P2 spacecraft			
5.3	Separate top half of SPELDA with attached Phase 3C in cylinder X			
5.4	Deploy PANAMSAT from lower half of SPELDA			
5.5	Separate cylinder X from top half of SPELDA			
5.6	3600 seconds after 5.5, deploy Phase 3C from cylinder X.			

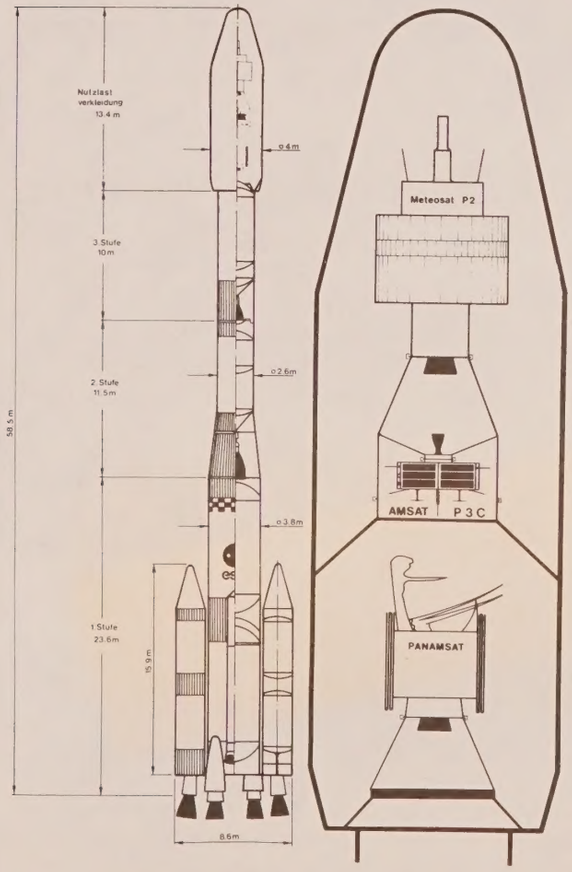


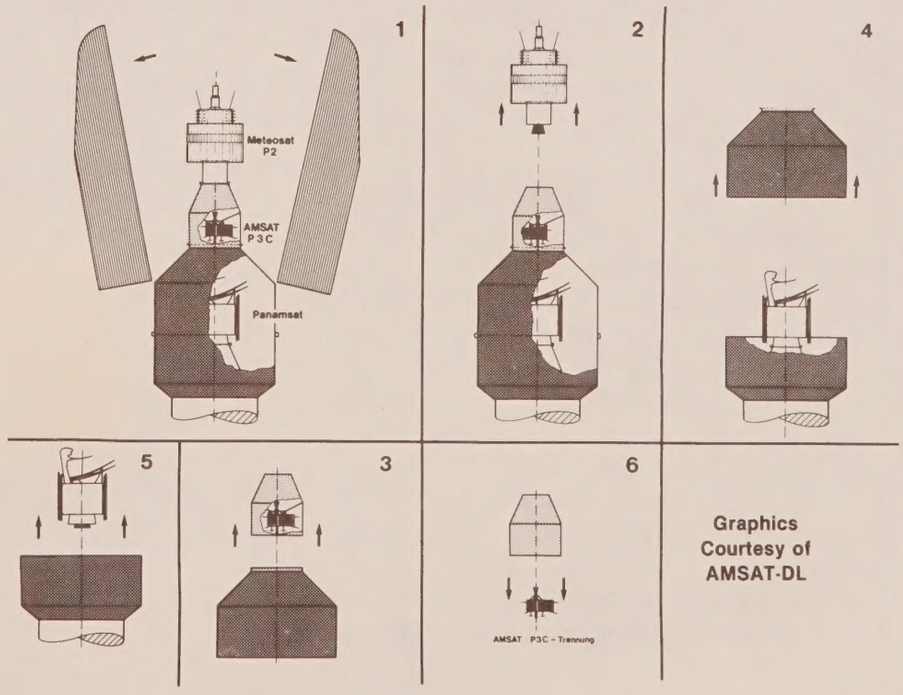
Figure 1a

Figure 1b

Figure 1a — The Ariane 4 launcher which will carry Phase 3C to a geosynchronous transfer orbit (GTO) stands 58.5 meters (192 feet) tall.

Figure 1b — The Phase 3C spacecraft is nestled in the middle of a stack.

Figure 2 — The satellite deployment sequence.



Graphics Courtesy of AMSAT-DL

Figure 2

ASR *SPOTLIGHT*

Ian T. Ashley, ZL1AOX

by Dr. L. M. "Pete" Killingsworth, KD7WZ

The neatly printed business card reads: "Captain Ian T. Ashley, AIR NEW ZEALAND." Known to his amateur radio friends as ZL1AOX, Ian makes a living as an airline pilot. He's a training captain on the Boeing 737, based in Auckland, New Zealand.

When he's not showing tyros how to do a smooth stick and rudder job, though, he's an important part of the AO-10 command team. Ian's location in the mid-latitudes of the southern hemisphere gave him an advantage in commanding AO-10 during those times when the satellite spent most of its time south of the equator. Ian did yeoman work when AO-10 first began to show signs that it was developing radiation-induced Alzheimer's Disease. His efforts contributed greatly to extending the useful life of our only elliptical orbit bird.

Ian first became interested in amateur satellites fifteen years ago. He was attracted to the technical side of VHF amateur radio communications, and satellites were "new and different." He finds meeting and visiting the people associated with the amateur satellite program to be the most interesting and enjoyable aspects of his activities, but says that, "sending commands to AO-10 and hoping that all is OK," is the most exciting part. (I'm sure those of us who are excited by just hearing our own downlink signal can relate to that.)

Ian's OSCAR station consists of a Yaesu FT-221 with a MuTek front end for 2 meters, although his main AO-10 receiver is a Kenwood TS-930S equipped with an Advanced Receiver Research 2 meter converter. His 2 meter antenna is the KLM 22C. For 70 cm Ian uses a Kenwood TR 9500 with a Klitzing amplifier and either a 19 element yagi or a 16-turn helical antenna. He uses the ICOM 1271A with a 4-foot dish for Mode L.

Ian relates a story about operating Mode L through AMSAT OSCAR 10 one day. "I was using the 4-foot dish lying on its back on the lawn. The dish had filled with water during a heavy storm, but it still seemed to work fine." Those words should be encouraging to anyone who has avoided Mode L because of all the technical constraints involved with 23 cm work.

In addition to his command duties, Ian is active on several satellites. Mode B is his favorite mode, although he wants to do more Mode L work when he gets his dish set up with az-el control. He has worked about 50 countries via amateur satellites. He has the K2ZRO Z-6 award on Mode B, achieved when AO-10 was only 3 degrees above the horizon. He was also given the AMSAT President's Technical Achievement Award and was named the NZART Amateur of the Year award in 1983 for his AO-10 work.

Ian's plans for the future include continuing to monitor and command AO-10, Phase 3C commanding and helping with the UoSAT DCE experiments. Hats off to Ian Ashley for his fine work in keeping our satellites running. And the next time you board an Air New Zealand 737, check the cockpit. He may be at the controls.

(With this contribution, we bid farewell to Pete, KD7WZ as a contributing editor. His fine work has graced the pages of *ASR* for a couple of years now. Pete will continue in other AMSAT roles and for that we're grateful. We look forward to working with this fine gentleman again! ---Ed)

AMSAT® NA

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In accord with AMSAT's Bylaws, a member dues change comprises a Bylaws change. A close review of the recently announced dues change suggests the possibility a technical (procedural) error may have occurred. Consequently, the prior announcement in *ASR* regarding a dues change may be invalid. In any case, members are advised that in accord with the Bylaws, after a Bylaws change is approved by the Board and notice of such change is given in *ASR*, the change becomes effective in thirty days unless 10% of the members object in writing in which case a mail vote of all members will be accomplished.

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